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Lower Bertrand Creek

Summary of 2015 Surface Water Monitoring Program Results

Washington State Department of Agriculture

Natural Resources Assessment Section

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Introduction

The Washington State Department of Agriculture has monitored pesticide concentrations in surface water throughout the state since 2003. Samples are collected during the typical pesticide use season (March through September). In 2015, 14 sites were monitored across Washington, including two in Whatcom County. State and federal agencies use this data to evaluate water quality and make exposure assessments for pesticides registered for use in Washington State.

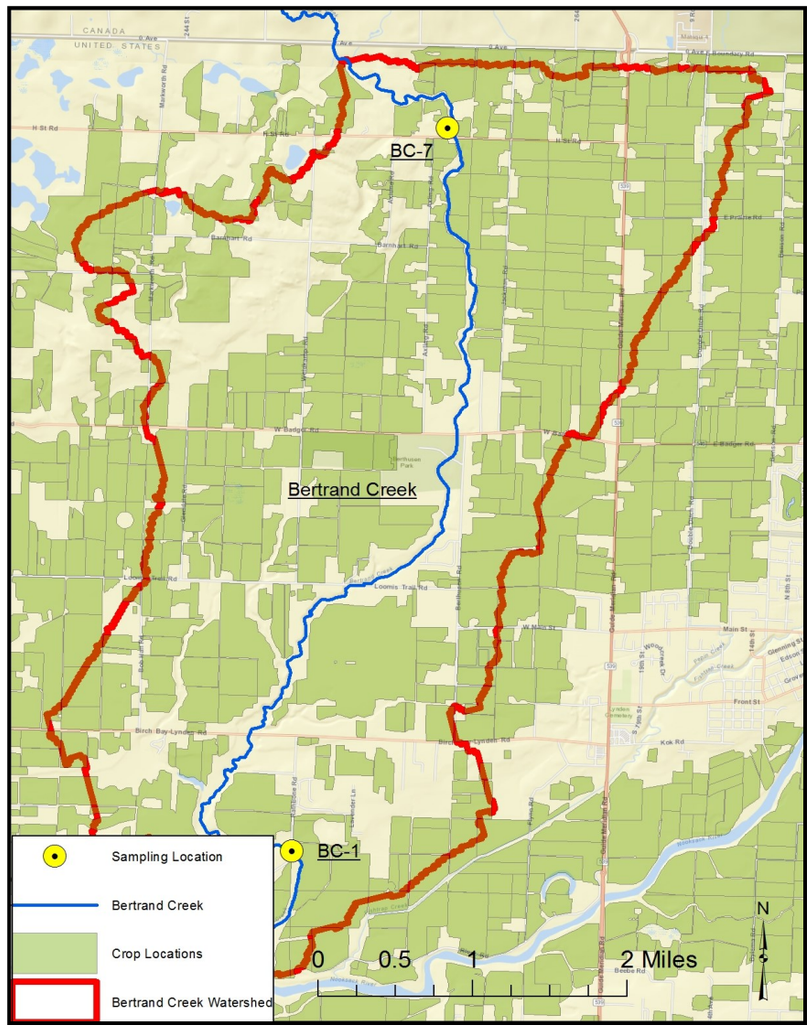
Study Area

Sampling in Bertrand Creek began in 2013. The Bertrand Creek watershed drains approximately 28,000 acres, or 44 square miles, between the United States and Canada. In the United States portion of the watershed, there are 7,745 acres of farmland. The main crops grown in the Bertrand watershed are: grass/hay, caneberries, field corn, blueberries, and potatoes. Bertrand Creek provides important habitat for many threatened species including steelhead, chinook, coho, chum, and sockeye salmon*.

* Washington State Department of Fish and Wildlife

Sampling Details

- Samples were collected for 25 weeks, from March 10 through August 24.
- Water samples were tested for 206 chemicals: current and legacy insecticides, herbicides, fungicides, rodenticides, wood preservatives, and pesticide degradates.
- Sample analysis for pesticides and total suspended solids was conducted at Manchester Environmental Laboratory in Port Orchard, WA.
- General water quality parameters; dissolved oxygen, conductivity, pH, water temperature, and streamflow were measured at every sampling event.
- Air and water temperature (measured every 30 minutes) was monitored for the entire sampling season.
- WSDA monitors Bertrand Creek at two locations; Upper Bertrand (BC-7) is located near the Canadian Border, Lower Bertrand (BC-1) is located 6.75 miles downstream. Two sampling locations provides an opportunity to compare potential inputs from Canada, to concentrations downstream.



This table shows the pesticides detected, with dates and concentrations. They are color coded to identify which assessment criteria were surpassed. The assessment criteria used here are state and federal water quality criteria, reduced by half for safety. This 0.5 safety factor is used to make sure the criteria protect aquatic life and water quality issues are found early. Watersheds with detections above the criteria are prioritized for more monitoring and educational outreach. See http://agr.wa.gov/PestFert/natresources/SWM for more information.

Assessment Criteria
May affect fish survival at sensitive life stages
Additional level of protection for endangered species
May affect invertebrate survival
Nearing a pesticide state water quality standard
May affect fish growth or reproduction with prolonged exposure
May affect invertebrate growth or reproduction with prolonged exposure
May affect aquatic plant growth
May affect aquatic plant growth or reproduction with prolonged exposure
Below all identified criteria
No published criteria available
Not detected (below detection limit)
No Data – –

Month and Day		Mar				Apr				May				Jun					Jul				Aug		
Analyte Name †	Use‡	10	17	24	31	7	14	21	28	5	12	19	26	1	9	15	23	29	7	14	21	27	4	10	17
2,4,6-Trichlorophenol	D-M															0.014									
2,4-D	H		0.05				0.052		0.054																
4,4'-DDE	D-OC																					0.01			
AMPA	H	--	--	--	--	--	0.081	0.046		0.073	0.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boscalid	F		0.11	0.12	0.14	0.065	0.066		0.095	0.083		0.053			0.13		0.038		0.052	0.04	0.074	0.034	0.035	0.023	
Bromacil	H											0.047	0.073				0.041	0.04	0.041	0.039	0.037	0.035	0.029	0.03	0.031
Chlorothalonil	F				0.034																				
Cyprodinil	F									0.019						0.062									
Diazinon	I-OP				0.062	0.026					0.051														
Dicamba	H		0.022																						
Dichlobenil	H	0.013	0.13	0.063	0.05	0.02	0.019	0.019	0.022	0.016	0.014	0.012													
Diuron	H				0.007		0.006	0.005		0.043					0.03	0.005			0.06		0.007	0.005			
Etridiazole	F		0.036																						
Glyphosate	H	--	--	--	--	--	0.056	0.022	0.054		0.021	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Imidacloprid	I-N	0.01	0.017	0.008		0.013	0.014	0.022	0.017	0.017	0.02														
Isoxaben	H			0.002			0.003	0.003																	
MCPA	H												0.052												
Malaoxon	D-OP	0.003			0.003		0.002														0.014	0.003			
Malathion	I-OP																				0.072				
Mecoprop (MCPP)	H		0.053						0.049																
Metalaxyl	F			0.18	0.27		0.16	0.061	0.06		0.063	0.062	0.14	0.19	0.16		0.07	0.07	0.069	0.078	0.07	0.055	0.045	0.058	0.059
Methomyl	I-C														0.012										
Metolachlor	H		0.064	0.075	0.06	0.032	0.032	0.031	0.031	0.029			0.042												
Monuron	H																								0.004
Myclobutanil	F							0.006																	
Oxadiazon	H						0.045																		
Oxamyl	I-C	0.278	0.113	0.223	0.164	0.183	0.17	0.243	0.143	0.16	0.089	0.09	0.082	0.088	0.087	0.11	0.11	0.14	0.14	0.13	0.19	0.11	0.15	0.14	0.14
Oxamyl oxime	D-C	0.159	0.089	0.074	0.067	0.078	0.095	0.184	0.093	0.12	0.075	0.09	0.083	0.085	0.097	0.1	0.1	0.12	0.15		0.16	0.082	0.12	0.11	0.11
Pentachlorophenol	WP		0.019																						
Propachlor	H														0.13										
Propiconazole	F		0.034	0.021	0.077	0.016	0.023	0.013	0.016																
Pyraclostrobin	F			0.014					0.026							0.05									
Simazine	H		0.29	0.23	0.19		0.057					0.061	0.075		0.067										
Sulfentrazone	H											0.074		0.18	0.22		0.068	0.068	0.072	0.076	0.067		0.064	0.064	0.057
Terbacil	H	0.055	0.11	0.11	0.13		0.093	0.06	0.07	0.06															
Tetrahydrophthalimide	D-F			0.17					0.096			0.046									0.049				
Thiamethoxam	I-N	0.02			0.013	0.021	0.011	0.022	0.013	0.022	0.016	0.022	0.026	0.024	0.027	0.039	0.035	0.034	0.041	0.047	0.041	0.047	0.045	0.05	0.037
Triclopyr acid	H					0.031																			
Streamflow	N/A	38.1	154.0	245.0	251.0	71.5	79.1	39.0	45.8	32.1	22.6	18.7	17.4	16.3	11.1	8.4	7.1	5.8	5.2	6.3	5.2	8.4	4.1	8.8	4.6
Total suspended solids	N/A	2	14	17	17	6	8	7	3	3	2	3	2	< 2	2	< 2	< 2	< 2	1	< 1	< 2	< 1	< 1	< 1	< 1

‡ C: Carbamate, D: Degradate, F: Fungicide, H: Herbicide, I: Insecticide, IR: Insect repellent, L: Legacy pesticide, M: Multiple, N/A: Not applicable, N: Neonicotinoid, OC: Organochlorine, OP: Organophosphate, PY: Pyrethroid, Sy: Syngergist, WP: Wood preservative, *Equipment malfunction. †Units follows: pesticides, µg/L; streamflow, cfs; and total suspended solids, mg/L.

Results Summary

- There were 238 total detections of 38 unique pesticides at Lower Bertrand Creek in 2015, 3 of which were above assessment criterion.
- Malathion concentrations on July 21 were above WSDA's assessment criteria and may affect fish growth or reproduction with prolonged exposure.
- 4,4'-DDE concentrations on July 27 and August 24 are nearing the state water quality standard and may affect fish growth or reproduction with prolonged exposure. 4,4'-DDE is a breakdown product of the legacy organochlorine, DDT.
- Oxamyl, oxamyl oxime, (degradate of oxamyl), thiamethoxam, metaxyl, and boscalid were the most commonly detected pesticides. Each being detected in at least 60% of sampling events.
- Oxamyl, simazine, metolachlor, diuron, imidacloprid, diazanon, and malathion are pesticides of concern in the state of Washington and were detected in 2015.
- Continued detections of pesticides of concern above assessment criteria could result in label use restrictions.

Recommendations

- Read and follow label directions to protect water quality.
- Eliminate drift and runoff to adjacent surface water.
- Maintain, inspect, and calibrate application equipment.
- Properly dispose of all pesticides.
- Implement best management practices, including conservation buffers, vegetative filter strips, sediment basins, and setbacks from water.
- Review pest control needs and select appropriate and less toxic pesticides.
- Manage irrigation to prevent runoff, and check the weather forecast before application to prevent runoff due to rainfall.